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DEVELOPMENTS IN DAIRY MARKETING AND THEIR IMPLICATIONS 1/

The dairy industry is in the midst of a period in which technological discoveries are being applied widely at all stages--in production, transportation, processing, and distribution of milk and its products. Like a chain reaction they affect the character and organization of the entire industry and the consumption patterns of all its products.

Some of the changes have been hastened or aided by the economic climate of our time, for during the last 15 years, employment opportunities have been plentiful and wage rates have been on the increase. During these years many marginal plant operators have sold out and moved to alternative positions, while a rapidly increasing population and growing urbanization have encouraged investment in plant and equipment.

Changes in Production

The most striking characteristic of the farm production of milk is that it has more than kept pace with market demands, though number of cows has declined. Since 1938, the number of milk cows has fallen 17 percent, while average annual production per cow has risen 37 percent, from 4,589 pounds to 6,438 pounds in 1959. Man-hours of labor per 100 pounds of milk produced decreased from 2.4 in 1950 to 1.8 in 1959. Back of these sharp changes have been: (1) General adoption of improved feeding practices; (2) wider knowledge and use of new feeds and improved roughages and pastures; (3) widespread use of superior dairy sires; (4) heavy investments in labor-saving facilities encouraged by the generally good financial conditions of dairy farmers and easy availability of capital during the postwar period; (5) rise in the average level of management on dairy farms.

The dairy farmer is becoming a specialist marketing whole milk. In 1959, whole milk comprised about 90 percent of farm dairy marketings compared with about 40 percent in 1939. Since 1954, the number of farms reporting milk cows has declined by about a third. Average production per farm has risen greatly as shown by daily average deliveries of producers in Federal order markets--from 399 pounds in 1954 to 619 pounds in January 1960. Probably these trends toward higher production per cow, increased herd size, and greater labor efficiency will continue for some time into the future.

Changes in Transportation of Milk

Adoption of expensive labor-saving equipment and methods has been a factor in increasing herd size. Particularly important in the last 5 years has been the widespread adoption of bulk milk tanks and in-place milking equipment on farms. In January 1956, about 30,000 bulk milk tanks were in use in the United States. By January 1960, nearly 142,000 were reported. From January 1959 to January 1960 the number of bulk tanks increased about 20 percent. In some localities, farmers are encountering increased difficulty in finding profitable outlets for can milk.

The increased use of tank trucks for moving milk from farm to plant has widened supply areas for plants and will ultimately wipe out the need for country assembly plants. Milk can be picked up at farms and moved directly over long distances to deficit plants and markets, without first being brought into a plant for cooling and reloading into an over-the-road tank truck. As an example, milk from Missouri farms in 1959 qualified for direct shipment to San Antonio, Texas.

These new possibilities have created problems in the pricing of farm milk.

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Location differentials--differences in farm prices for milk originating at different distances from the market--have had to be reexamined. In the New York-New Jersey market order, separate provisions are proposed for directly shipped milk and milk reshipped from country plants to handlers. The farm location rather than the country plant is proposed as the pricing point. The bulk route, rather than the country plant, is the unit which must be qualified for the pool.

Changes in Processing and Distribution

Reduction of Labor Inputs.--In processing, the new technology has been aimed largely at reducing labor inputs, and it has been remarkably successful. As an example, one dairy product plant handling over 1.5 million pounds of whole milk daily requires only 9 men to operate its plant. Its products include ice cream mix, bulk cream, nonfat dry milk, and condensed skim. In the flush season, a continuous churn makes sweet butter which is stored for ice cream making. Pushbuttons control the metering of ingredients by electric pumps. This plant receives bulk milk and moves its liquid product in bulk tanks. Ice cream making now can be completely automated, thanks to the development of the continuous freezer, packaging equipment, and hardening tunnel.

Larger fluid milk plants have decreased unit labor inputs heavily by high-temperature short-time pasteurizing, automatic handling of packaged milk, and in-place cleaning. In spite of increased wage rates and material costs, 80 representative medium and large milk plants studied by the U. S. Department of Agriculture held processing costs to a 1-percent rise from 1955 to 1958. Smaller firms are hindered in taking full advantage of the new technology by lack of capital resources, small volume, position in the market, and sometimes by quality of management, and their inability is reflected in their costs. In smaller firms (under 15 million pounds of product sales per year), unit processing costs averaged 36 percent above those of large firms (over 30 million product pounds annually).

Decline in Number of Plants.--The number of fluid milk plants has been declining since the 1930's, and volume per plant has increased. The U. S. Department of Agriculture study of 80 fluid milk firms shows that between 1952 and 1959 the annual volume of large plants rose 34 percent, medium-size plants 57 percent, and smaller plants 37 percent. Much of this increase came from absorbing volume from plants which have gone out of business. Preliminary data from the 1958 Census of Manufactures indicate a 5-percent decline since 1954 in the number of fluid milk establishments having 20 or more employees. 2/ This change suggests a sharper decline in the number of smaller plants.

The drop in numbers of dairy manufacturing plants, which is more dramatic, has been hastened by the change from processing farm-separated cream to whole milk. Between 1939 and 1958 the number of plants reporting butter production fell 58 percent, American cheese, 51 percent, evaporated milk, 45 percent wholesale ice cream, 37 percent. Only nonfat dry milk plants increased in number--76 percent. In the same period, average production reported per plant increased 87 percent for butter, 271 percent for American cheese, 94 percent for evaporated milk, 248 percent for wholesale ice cream, and 263 percent for nonfat dry milk (human food). This trend is expected to continue.

A major part of the fall in plant numbers is due to mergers of small cooperatives and proprietary firms. Mueller reported that small concerns accounted for 70 percent of mergers and consolidations. 3/ The Federal Trade Commission Report on Corporate Mergers and Acquisitions showed that between 1948 and 1954 the two corporations that made the most acquisitions were dairy farms--Foremost with 48 acquisitions and Borden with 17; National

2/ Adjusted for 87.5 percent coverage in 1958 and 75 percent in 1954. 3/ Mueller, W. F., "A Comment on The FTC's Report on Mergers with Special Reference to Dairy Mergers," Journal of Farm Economics V XXXIX, No. 1, Feb. 1957, pp. 140-152.

Dairy was twelfth with 8. A more recent study of 302 multiunit dairy product firms made by the Department showed that, between 1952 and 1958, these firms acquired 376 other firms. 4/ One dairy product firm was in the group that made between 50 and 79 acquisitions and 3 more were in the group with 20 to 49 acquisitions. Of the acquisitions in this study 85 percent were horizontal integrations, 7 percent vertical integrations, and 8 percent were diversifications through purchase into a different industry.

Pressure for Uniform Sanitary Regulation.--The shift from small butter and cheese plants to large multiproduct milk plants has created a large reservoir of milk that is a potential supply for fluid use. Improved roads, trucks, refrigeration, and equipment make it possible to preserve the quality of milk during a haul of 1,000 miles or longer. Plants that control this supply are eager to obtain premium price outlets and press for changes in sanitary and economic regulations that will make more Class 1 milk outlets available to them. Bills have been introduced in Congress calling for uniform sanitary regulations of interstate milk shipments. Support for such legislation also comes from fluid milk distributors who seek to widen their marketing areas. Even without such measures milk is flowing more readily among markets. U. S. Public Health Service ratings of milk of various plants have facilitated this movement. These ratings are widely accepted by sanitarians as evidence for certifying the acceptability of milk. With certain noteworthy exceptions, economic considerations rather than sanitary regulations limit the movement of milk.

Centralized Milk Processing.--Developments in the distribution of fluid milk are more extensive than those in the distribution of manufactured products. The current trend toward large plants is centralizing fluid milk processing. Large volume plants at the perimeter of city areas serve fringe areas and nearby markets in addition to the central city market. From these plants, trucks move milk to wholesale outlets--stores, institutions, and other users. Semitrailers haul milk to distribution centers strategically located to service home delivery routes, either local or at distant points, and serice distant wholesale stops.

The key to this change from local to area plants has been the ability of plants to incorporate new technology into their processing in order to lower costs. By this means they were able to increase net income by increasing sales. With low-priced milk they could invade sales territories of high-cost firms. Such invasions generally involve wholesale distribution of milk in paper containers. Deliveries to home are involved when local distributors cease processing, buy packaged milk and merely distribute it, or when peddlers buy it and start new home delivery routes. Local sales are increased usually by aggressive sales campaigns, sometimes accompanied by price cutting, use of wholesale discounts, and various forms of nonprice competition.

In response to widening distribution areas, definitions of markets under most Federal orders have been widened. Two or more Federal order markets have been merged under a single order in several instances. Orders recently initiated cover substantial marketing areas. Long-distance movement of milk eventually may develop to the extent that orders will be established on a regional basis, or even nationally.

Increased Home Delivery Costs.--Home delivery costs have risen as cost of equipment and wages have gone up, reflecting a lack of economies of scale and inflexible labor requirements. As a result, some companies are divesting themselves of the retail distribution function. In Detroit recently, for example, major dairies turned retail routes over to drivers as more-or-less independent operators. In New Jersey, Southern California, Pennsylvania, and other areas independent milk delivery already is substantial. The Borden Company in New York has leased its retail routes to 11 companies which specialize in retail distribution. Specialization in retail distribution offers a chance

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4/ Nelson, P. E., Jr. and Paul, A. B., Ownership Changes by Purchase and Merger in Selected Food Industries, Mkt. Res. Rpt. 369, U. S. Dept. Agri., AMS, Washington 25, D. C. 1959.

for survival of smaller companies with high processing costs or limited capital, but with considerable customer good will.

Shift from Home Delivery to Store Sales.--The shift from home delivery to store sales--perhaps the most noteworthy change in fluid milk distribution--is still continuing. The study of 80 representative milk distributors mentioned previously shows that their wholesale sales grew from 58 percent to 63 percent of total sales from 1956 to 1959. While the grocery store has become the predominant wholesale outlet, less conventional ways of selling milk are gaining importance. The number of dairy stores has grown. Drive-ins are numerous in the Western States. Vending machines have tripled in number since 1955. On January 1, 1960, 47,300 indoor milk vending machines and 34,700 ice cream vending machines were reported. In 1959, they sold $81 million of milk and dairy products.

But the shift toward store sales has slowed up. Some consumers want home delivery, hence such service will continue. To this end, firms are endeavoring to lower costs of home delivery routes. In most markets, frequency of deliveries has declined from daily to three times weekly, and in some markets twice-a-week delivery is found. Definitely, the trend is toward fewer deliveries. With concentrated milk, perhaps weekly deliveries to homes would be found feasible. On the other hand, a successful concentrated milk or dry whole milk sold at relatively low prices as a staple item in food stores undoubtedly would increase the proportion of milk sold through stores.

Changing Price Policies.--Innovations in containers and pricing policies were a major cause of the shift from home delivery to wholesale distribution. Quantity discounts were early introduced on home delivery routes to counter the lower per quart prices charged consumers at stores. Quantity discounts are based on the fact that the cost of delivering several quarts of milk is only slightly more than the cost of delivering 1 quart. Rather than reduce single-quart prices or establish quantity discounts on quart units of milk or in order to differentiate their products, distributors introduced half-gallon and gallon containers into markets at discount prices.

Changes in Containers.--Use of multiple-unit containers has become general. In our 80 representative milk firms, sales in multiple-unit containers increased from 15 percent of the total volume of milk sold in 1956 to 57 percent in 1959. This research also shows that from 1956 to 1959 the change from retail to store sales, plus increased sale of milk at quantity discounts, reduced the average price of milk paid by consumers at least 0.5 cent per quart, though the single quart price went up about 1 cent.

A tetrahedral paper container has proved successful in Europe, and USDA research has shown it to be a low-cost way of providing milk to schools. It could be the next major container innovation. A new plastic container advertised recently also may become popular.

Price Wars.--Because technological developments are widening distribution and supply areas, pricing in the fluid milk industry is more competitive than it was 10 years ago, and price wars are more frequent. No less than 20 price wars in major markets were reported from June 1959 to March 1960. To increase volume or widen distribution areas, some firms have introduced pricing innovations and multiple-unit containers into markets which have had stable prices for long periods under what might be called "administered pricing" or price leadership. When a firm reduces prices in a market, established sales and price patterns are disrupted, and price wars often break out. In time, new equilibria can be expected. New sales and price patterns and widened sales areas, based on processing and distribution innovations frequently are established.

Intensive study of one price war indicated that larger firms with sufficient capital to sustain aggressive tactics can survive and increase their share of the market. Small firms often cannot support a price war and are forced to merge or close their doors.

More Regulation.--Intensified wholesale and retail price competition and increased mobility of milk have been major causes for the increase in the regulation of producers' milk prices.

Federal orders, which set minimum prices, have increased from 19 in 1940 to 80 in 1960. Eighteen States also regulate producer prices. Over two-thirds of the supply of milk for city markets falls under State or Federal producer price regulations.

The extent and duration of resale price cutting or price wars depend on the financial reserves, the technological advantage of firms involved, and on their ability to pass resale price cuts to producers as lower farm prices for milk. In a price war, plants with financial reserves or technological advantages, like other firms, are prone to reduce prices paid producers or to obtain low-priced milk from sources outside the usual milkshed.

Faced with the threat of a price cut or disruptive marketing conditions, producers have petitioned for and obtained Federal and State orders. They have sought to prevent the chaotic effects of price wars from extending to prices they receive. Often distributors have supported their action.

In some States increased price competition, sometimes as a result of pricing innovations or the entry of outside milk, has brought about State legislation to control retail pricing. Such legislation has taken the form of State milk orders or fair trade laws. Of the 19 State milk control laws in effect at present, 16 authorize setting minimum resale prices, and 13 control retail prices. Milk control laws have been brought before the legislatures of a dozen or more other States.

Fair trade provisions of one type or another are contained in all State milk control acts. In addition, specific fair trade laws applying to milk sales have been passed in a number of States that do not establish producer or resale prices. These laws seek to limit price and nonprice competition without rigidly controlling resale prices. Such laws may affect profit margins, pricing methods, advertising, and various other forms of nonprice competition.

Both fair trade laws and resale price fixing provisions tend to hinder competition from performing its role of allocating marketing resources. They may inhibit technological advances in processing and distribution and lengthen the life of inefficient operations and outmoded practices. These are not necessarily effects of retail price fixing. More distribution innovations have started in California, which fixes resale prices, than in most other States--drive-ins, for example, originated in California. They are a combination of plant and dairy store, and they sell milk at the price established for retail sales at dairy plants. Some drive-ins have been started by milk producers seeking higher returns, and others are units in chains of drive-ins. Increasing in number, they appear to be reaching the point of taking an appreciable part of the market. Recently a use permit was denied for a mobile plant developed for processing milk at grocery store locations, so they also might sell milk at prices equivalent to plant platform prices. The success of drive-ins raises the question anew whether small-scale plants can compete with large plants on the basis of efficiency.

Less Dramatic Changes for Manufactured Products.--Technological changes in processing and distributing manufactured dairy products appear less dramatic than those for fluid milk, but they have had significant impacts on marketing. A method for continuous churning of butter was developed in the 1940's, however, most butter is still churned by the batch method. A continuous process for cheese is reported, but it is not yet perfected. Ice cream making in larger plants now can be a completely continuous automated operation; specialized plants are making an increasing proportion of frozen products.

Pasteurizing milk and cream before making cheese and butter is now general. This, plus improvement in the quality of farm milk delivered to plants, has made possible more uniform and higher quality products than those formerly available. In a recent survey covering about half the stores in one city, 70 percent of samples of all brands of butter sold in the stores were grades A or AA.

Developments in packaging and packaging equipment, together with uniform quality, have aided the growth of mass merchandising of natural cheese and ice cream in food stores and increased their consumption. Dairy counters in food stores now offer a variety of natural cheeses and cheese foods formerly available only in scattered specialized cheese stores. Food stores now sell between 50 and 60 percent of frozen products while drugstores, formerly the major outlet, handle only about 6 percent. Improvements in home refrigeration have aided this shift. Families today buy ice cream in larger packages than formerly to have a supply on hand for use as a daily food. Over 60 percent of packaged ice cream now is sold in half-gallon containers.

Equally significant is the shift in nonfat dry milk processing from roller to spray powder, development of types of powder for specific uses, and the invention of instantizing, which drove regular powder out of the retail market. Cottage cheese, like ice cream, more and more is being made in specialized plants. Methods have been developed for using nonfat dry milk to make a uniform high-quality cottage cheese, and cottage cheese making no longer is dependent on supplies of surplus skim milk in city markets.

Changing Pattern of Dairy Product Sales.--Technological changes have had significant effects on the pattern of sales of milk and dairy products.

Homogenizing has become so generally accepted that in 1959 about 96 percent of whole milk sales by USDA's 80 representative milk distributors was homogenized milk. From 1956 to 1959 cream-line and premium milk sales declined from 9 to 4 percent.

The use of nonfat dry milk and condensed skim milk for fortifying fluid milk and for reconstitution has been approved in some States, when the products are properly labeled. Cottage cheese, another skim milk item, has more than doubled sales since 1950. Sales of skim milk items--buttermilk and skim or low-fat milks--increased 85 percent compared with a 27-percent increase in total sales by the 80 representative firms. Some of this increase has been due to increasing emphasis on weight control by the general public.

Instant nonfat dry milk has become an important household source of milk. In 1959, 21 percent of the nonfat dry milk sold for use in this country was packaged for home use. Recombined milk, made from nonfat dry milk and butter oil or vegetable oils, has been developed for use in deficit oversea areas and, with some assistance from Government programs, has become a significant outlet for nonfat dry milk. Recent establishment of standards for grade A nonfat dry milk and condensed skim milk, and the approval by many States and municipalities of fortified milk open a possibility for the acceptance of recombined milk for domestic sale, without discriminatory labeling. Should income and employment conditions make consumers in this country more price conscious, recombined milk might receive greater attention. Given favorable conditions recombined milk might well attain extensive acceptance in markets which are short of milk and can obtain additional supplies only at a high cost. Nonfat dry milk and butter oil obtained from pool plants in Federal order markets located in the manufacturing dairy areas could be delivered to a number of markets at prices well below the cost of obtaining fluid whole milk.

The rise of these various substitutes for fresh whole milk constitutes a sustained and determined attack on the differentiated fluid milk portion of the dairy market. However, USDA research indicates that domestic sales of instant nonfat dry milk are supplemental to whole milk sales rather than competitive. There is no indication that fluid milk has lost an appreciable amount of sales. Since 1948 consumption of fluid milk and cream has been fairly stable at around 350 pounds of milk equivalent per person. On the other hand the quantity of milk fat sold in fluid milk has decreased. School lunch and special milk programs now amount to 4 percent of sales instead of 1 percent in 1948.

Concentrated milk and instant dry whole milk have been a source of considerable concern to much of the fluid milk industry. Fresh concentrate introduced in 1950-51 failed to make much of a dent in fluid sales. Distributors have been unwilling or unable to price the product far enough below fresh fluid milk to get consumers to accept it.

No major attempt has yet been made at low-cost distribution for concentrated milk that will utilize its natural advantage of low bulk as a basis for quantity sales and reduce number of deliveries per week to stores and homes.

Sterile concentrated milk, to be sold as a staple product in stores, was scheduled for market trials this fall, but there are indications that technical problems have delayed its entry to market. USDA has developed an instant whole milk powder of excellent flavor after reconstitution, but practical ways are yet to be found for combating fat oxidation and increasing its shelf life.

These concentrated products could force more rapid improvement in fluid milk distribution, lowering consumer prices, and increasing milk use. If they displace a significant part of fluid milk sales, producers in city milksheds will face declining blend prices; those in surplus milk areas will get slightly more for their milk.

The advent of polyethylene consumer packages of rindless natural cheese has popularized natural cheese. Increased natural cheese sales probably have accounted for most of the increase in cheese sales from 5.9 pounds per person in 1935-1939 to 8.3 pounds in 1959. Foreign-type cheese has become more popular, and its production in the United States is increasing.

Soft-serve frozen products, especially ice milk, are gaining in popularity, though they still make up only 9 percent of the production of frozen products. Mellorine-type frozen products, which use vegetable fat in place of milk fat, are gaining in the 12 States where their sale is permitted. Novelties also are competing increasingly for the frozen product market.

The major dairy market of the United States continues to be at home. Exports are declining. In 1959, about 1 percent of farm milk production in terms of milk equivalent was exported as dairy products as compared with nearly 3 percent in 1957 and 1958, and more than 3 percent in 1947. Exports would be substantially lower without donations and assistance from Government programs which make possible extensive sales at reduced prices. Dollar sales promise to be somewhat higher in 1960.

Imports, except for casein and foreign cheese, are insignificant. These products supplement U. S. production rather than compete with it. The entry of competing products is limited by quotas under section 22 of the Agricultural Adjustment Act.

Implications

The dairy industry is midway in a major adjustment of plants, distribution, and products. A continuation of the trends of the last few years can be expected. Processing and manufacturing plants throughout the country will continue to become fewer in response to changes in technology which make large volume imperative. These adjustments will be particularly noticeable in the midwestern dairy manufacturing States. Increasingly such dairy products manufacturing areas will become sources of milk for bottling as sanitary regulations and their application become more uniform. As a result of more free and widespread movement of milk, prices of farm milk in different localities can be expected to become more closely aligned, differing chiefly by the costs needed to move the milk to market.

Distribution, which takes the largest portion of the margin between farm milk and the consumer, has changed. It will probably change more in the immediate future, at least in fluid milk, than will other functions of marketing.

The changes so far have given food stores a firm and important place in price-making for fluid milk. Heavy dependence of milk distributors on food stores as outlets, the strong bargaining position of food chains buying large quantities of milk, and heavy competition among stores for retail business will keep up pressure for lower fluid milk prices. Competition from drive-ins, gallon jug stores, vending machines, and the impact of new products such as concentrated milk and dry whole milk will intensify this pressure on food stores to keep milk prices low.

With this kind of situation, fluid milk firms have no choice but to organize both wholesale and retail distribution more efficiently.

Manufactured dairy products, which already have relatively low-cost distribution through food stores, are making their adjustment at the plant level by establishing more efficient units, in some cases by specializing plants for production of one product. In larger firms with sales organizations, unit-selling costs may be lowered by adding new products to their lines, often through mergers or purchases of other firms. The more uniform and higher level of quality brought about in dairy products has made feasible mass merchandising of cottage cheese, ice cream, and natural cheese. But it also has lessened the individual character of each plant's and firm's product. More and more, firms will depend on advertising, distinctive packaging, and other promotional methods to differentiate their products. These considerations suggest the continued development of regional and national dairy distributors integrated to include all marketing functions from the dairy plant to the food store, able to take advantage of specialized production in plants, and large enough to support a strong sales organization and regional or national promotion.

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